

1 WHAT IS CLAIMED IS:

1. A video camera comprising:

a material element, arranged in a photographing optical system, for controlling a light transmission factor or a light transmission amount;

photoelectric conversion means for receiving an optical image transmitted through said material element at a position of an imaging plane, and converting the optical image into an electrical image signal; and

correction means for correcting light transmission factor wavelength dependency of said material element in accordance with light transmission factor characteristics or light transmission amount characteristics of said material element.

2. A video camera according to claim 1, wherein said correction means adjusts a correction amount of the light transmission factor wavelength dependency in accordance with the light transmission factor or the light transmission amount of said material element.

I. 3. A ~~video~~ camera according to claim 1, wherein ~~the correction of~~ said correction means ^{corrects said change} ~~is achieved~~ by auto white-balance control ^{of} ~~for~~ an output signal from said photoelectric conversion means.

4. A ~~video~~ camera according to claim 1, wherein
~~the correction of said~~ ^{by} ~~correction means~~ ^{corrects said change} ~~is achieved~~ by
changing a sensitivity of said photoelectric conversion
means in accordance with a light wavelength.

5. A video camera according to claim 1, wherein
~~the correction of said correction means is achieved by~~
a filter provided to said photographing optical system
or said photoelectric conversion means.

6. A ~~video~~ camera according to claim 1, wherein
~~the correction of said~~ ^{by} ~~correction means~~ ^{corrects said change} ~~is achieved~~ by
arranging another ^{physical} ~~material~~ element capable of
controlling a light transmission factor in ~~said~~ ^{the}
photographing optical system.

7. A video camera according to claim 1, wherein
said correction means comprises storage means for
storing the light transmission factor wavelength
dependency of said material element or the correction
amount of the light transmission factor wavelength
dependency of said material element.

8. A video camera according to claim 7, wherein
said storage means stores a plurality of light
transmission factor wavelength dependencies or a
plurality of correction amounts in accordance with the

1 light transmission factor or the light transmission
amount of said material element.

9. A video camera comprising:

5 a material element, arranged in a photographing
optical system, for controlling a light transmission
factor or a light transmission amount;

photoelectric conversion means for receiving an
optical image transmitted through said material element
10 at a position of an imaging plane, converting the
optical image into an electrical image signal, and
capable of adjusting at least one of a light
accumulation time and a sensitivity; and

exposure amount adjustment means for adjusting the
15 light transmission factor or the light transmission
amount of said material element, and at least one of
the light accumulation time and the sensitivity of said
photoelectric conversion means.

20 10. A video camera according to claim 9, wherein
said exposure amount adjustment means electrically
adjusts the light transmission factor or the light
transmission amount of said material element.

25 11. A video camera according to claim 9, wherein
said exposure amount adjustment means adjusts the light
transmission factor or the light transmission amount of

1 said material element in accordance with incident
light.

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12. A video camera according to claim 9, wherein
5 said exposure amount adjustment means comprises storage
means for storing at least one relationship between the
light transmission factor or the light transmission
amount of said material element and the light
accumulation time or the sensitivity of said
10 photoelectric conversion means.

13. A video camera having a photographing optical
system consisting of an optical element such as a
photographing lens, and image pickup means, wherein a
15 material element capable of controlling a light
transmission factor is arranged in one of said optical
element and said image pickup element.

14. A video camera according to claim 13, wherein
20 said material element is formed on said optical
element.

15. A video camera according to claim 13, wherein
said material element is held by an optical element
25 holding member of said photographing optical system.

1 16. A camera, which has a photographing optical
system, a material element, having polarization means,
for controlling a transmission light factor or a
transmission light amount of said photographing optical
5 system, light reflection means, and photoelectric
conversion means arranged on an imaging plane of said
photographing optical system or on a plane optically
equivalent to the imaging plane, comprising: circularly
polarizing light conversion means arranged on a side of
10 the imaging plane of said material element or on a side
of the plane optically equivalent to the imaging plane,
wherein said light reflection means is arranged between
said photoelectric conversion means and said circularly
polarizing light conversion means.

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17. A camera according to claim 16, wherein said
material element and said circularly polarizing light
conversion means are integrally arranged.

20 18. A camera, which has a photographing optical
system, a material element, having polarization means,
for controlling a transmission light factor or a
transmission light amount of said photographing optical
system, light reflection means, and photoelectric
25 conversion means arranged on an imaging plane of said
photographing optical system or on a plane optically
equivalent to the imaging plane, wherein said material

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19. A video camera, which has a photographing
5 optical system including a material element, having
polarization means, for controlling a light
transmission factor or a light transmission amount, and
an optical lowpass filter, and also has photoelectric
conversion means arranged on an imaging plane of said
10 photographing optical system or on a plane optically
equivalent to the imaging plane, comprising: circularly
polarizing light conversion means arranged on a side of
the imaging plane of said material element or on a side
of the plane optically equivalent to the imaging plane,
15 wherein said optical lowpass filter is arranged between
said photoelectric conversion means and said circularly
polarizing light conversion means.

20 20. A video camera according to claim 19, wherein said material element and said circularly polarizing light conversion means are integrally arranged.

21. A video camera, which has a photographing optical system including a material element, having polarization means, for controlling a light transmission factor or a light transmission amount, and an optical lowpass filter, and also has photoelectric

- 1 conversion means arranged on an imaging plane of said
photographing optical system or on a plane optically
equivalent to the imaging plane, wherein said material
element is arranged between said photoelectric
5 conversion means and said optical lowpass filter.

22. A camera, which has a photographing optical
system including a material element capable of
controlling a light transmission factor or a light
10 transmission amount, and also has photoelectric
conversion means arranged on an imaging plane of said
photographing optical system or on a plane optically
equivalent to the imaging plane, wherein said material
element has a filter function of removing near infrared
15 light.

23. A camera, which has a photographing optical
system including a material element capable of
controlling a light transmission factor or a light
20 transmission amount, and also has photoelectric
conversion means arranged on an imaging plane of said
photographing optical system or on a plane optically
equivalent to the imaging plane, wherein said material
element and a filter for removing near infrared light
25 are integrally arranged.

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1 24. A video camera, which has a photographing
optical system including a material element capable of
controlling a light transmission factor, and also has
photoelectric conversion means arranged on an imaging
5 plane of said photographing optical system, comprising:
correction means for correcting light transmission
factor wavelength dependency characteristics of said
material element.

10 25. A video camera according to claim 24, further
comprising storage means for storing the light
transmission factor wavelength dependency
characteristics of said material element, which are
obtained when said material element is in a
15 predetermined state.

26. A video camera according to claim 25, wherein
said storage means is storage means for storing a
plurality of light transmission factor wavelength
20 dependency characteristics of said material element,
which are obtained when said material element is in the
predetermined state.

27. A video camera according to claim 25, further
25 comprising temperature detection means, and wherein
said storage means is storage means for storing a
plurality of light transmission factor wavelength

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1 dependency characteristics of said material element
under a predetermined temperature condition.

28. A video camera, which has a photographing
5 optical system including a material element capable of
controlling a light transmission factor or a light
transmission amount, and also has photoelectric
conversion means arranged on an imaging plane of said
photographing optical system, wherein when said
10 photoelectric conversion means does not perform a
photoelectric conversion operation, said material
element is set in a light shielding state, a
substantially minimum light transmission factor state,
or a substantially minimum ~~light transmission~~ amount
15 state.

29. A video camera according to claim 28, wherein
when a power switch of said video camera is turned off,
said material element is set in the light shielding
20 state, substantially the minimum light transmission
factor state, or substantially the minimum light
transmission amount state.

30. A video camera according to claim 28, further
25 comprising reproduction means for reproducing a
recorded image, and wherein when said video camera is
set in a reproduction state of the recorded image or in

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1 a reproduction mode of the recorded image, said
material element is set in the light shielding state,
substantially the minimum light transmission factor
state, or substantially the minimum light transmission
5 amount state.

31. A video camera according to claim 28, wherein
when said photoelectric conversion means does not
perform a photoelectric conversion operation, voltage
10 application to said material element is not performed.

32. A video camera according to claim 28, wherein
when said photoelectric conversion means stops a
photoelectric conversion operation, said material
15 element is set in the light shielding state,
substantially the minimum light transmission factor
state, or substantially the minimum light transmission
amount state, and thereafter, voltage application to
said material element is stopped.

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33. A video camera according to claim 31, wherein
when voltage application to said material element is
not performed, said material element is set in the
light shielding state, substantially the minimum light
25 transmission factor state, or substantially the minimum
light transmission amount state.

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35. An optical system having a light amount adjustment device, which controls a passing light amount by arranging a plurality of material elements capable of adjusting a transmission factor in an optical path of an optical system.

37. An optical system according to claim 36, wherein said at least one material element divided into the plurality of regions is arranged near an iris position of said optical system.

38. An optical system according to claim 35,
wherein an optical element on a light incident surface

1 side and a light exit surface side of which said
material elements are arranged is arranged in the
optical path of said optical system.

5 39. An optical system according to claim 38,
wherein said material element is formed on the entire
surface of at least one of the light incident surface
and the light exit surface of said optical element, and
said material element is formed on only a ring-shaped
10 region of a circle having an optical axis as a center
on the other surface.

40. An optical system according to claim 35,
wherein said material element is formed on at least one
15 surface of an optical member constituting said optical
system.

20 41. An optical system having a light amount
adjustment device, wherein when a plurality of material
elements capable of adjusting a transmission factor are
arranged in an optical path of said optical system to
control a passing light amount, a light transmission
region of at least one of said plurality of material
elements is divided into a plurality of regions, and a
25 transmission factor of at least one of the divided
regions can be adjusted independently of the other
regions.

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1 42. A video camera, which has an optical system
for forming an image of an object image on an image
pickup element, and transmission light amount
adjustment means, arranged in an optical path of said
5 optical system, for adjusting a transmission light
amount, comprising:

light accumulation time adjustment means for
adjusting a light accumulation time of said image
pickup element; and

10 exposure amount control means for, when a change
speed of an incident light amount to said optical
system exceeds a light amount change speed
corresponding to an adjustment limit of said
transmission light amount adjustment means, changing
15 the light accumulation time of said image pickup
element until exposure amount adjustment of said
transmission light amount adjustment means is enabled.

20 43. A video camera according to claim 42, further
comprising gain adjustment means for adjusting a gain
of a video signal, and wherein said gain adjustment
means operates together with said exposure amount
control means.

25 44. A video camera, which has an optical system
for forming an image of an object image on an image
pickup element, and a material element, arranged in an

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1 optical path of said optical system, for adjusting a
transmission light amount, comprising:

gain adjustment means for adjusting a gain of a
video signal; and

5 exposure amount control means for changing the
gain of the video signal until exposure amount
adjustment using said material element alone is enabled
in addition to transmission light amount adjustment
using said material element under a condition that a
10 change speed of an incident light amount to said
optical system exceeds a light amount change speed
corresponding to an adjustment limit of said material
element.

15 45. A video camera according to claim 44, further
comprising light accumulation time adjustment means for
adjusting a light accumulation time of said image
pickup element, and wherein said light accumulation
time adjustment means adjusts the light accumulation
20 time of said image pickup element together with said
exposure amount control means.